

Theoretical Models of the Structure of the Interstellar Medium

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The life cycle of the interstellar medium (ISM) is intimately bound up in our quest to understand the evolution of galaxies and star formation. Astronomers have made great observational strides in the past several years to characterize the ISM by obtaining large scale, high spatial resolution maps of the ISM with gas tracers such as CO and HI, and dust infrared continuum emission. Observations reveal different phases as well as a great deal of structure on all scales. Among the most important are the molecular clouds which are sites of star formation. Among the fundamental astrophysical questions are how do clouds form, evolve, and fragment. Evolution and fragmentation are difficult to treat theoretically because of the highly non-linear nature of the magnetohydrodynamic equations required to describe the motion of the clouds, as well as the variation in local energy sources, and the variety of microphysical phenomena that play a role in the thermal and ionization of the ISM. I will review some of the theoretical considerations put forth to explain the structure and evolution of the ISM, and the fragmentation of the interstellar clouds.